

Zero Retries issue 0154 2024-05-31

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1700+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0154>

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Major Conference Countdowns

- [HAM RADIO 2024](#) in Friedrichshafen, Germany on 2024-06-28 thru 30, in 04 weeks! (*Previous mentions of HAM RADIO 2024 have been off by two weeks - please help me keep these correct, folks.*)
- [JARL Ham Fair 2024](#) in Tokyo, Japan on 2024-08-24 and 25, in 12 weeks!

See other events at the Zero Retries Guide to Zero Retries Interesting Conferences.

Greetings From SEA-PAC at Seaside, Oregon, USA

I'm in (sunny!) Seaside this weekend to soak in some Amateur Radio ambiance and do a little bit of evangelism for Zero Retries at [SEA-PAC 2024](#), which is

The Northwest's Largest Ham Convention and the ARRL Northwestern Division Convention

As explanation to those outside the Pacific Northwest, despite our major cities of Portland, Seattle, and Vancouver, there is no other all-weekend Amateur Radio conference in the Northwest. Thus, SEA-PAC is the “Hamvention” of the Northwest.

SEA-PAC is held in a small convention center in the middle of Seaside, which is a vacation destination on the beautiful Oregon coast, so there are ample distractions besides Amateur Radio to justify a family vacation for non-techie Dad and the kids while Mom indulges in some total immersion of Amateur Radio for a few hours at a time. It's common for SEA-PAC attendees to drift in and out of SEA-PAC to attend a seminar, check back with an exhibitor that was previously too crowded, and then go for a walk or extended lunch, etc. SEA-PAC has an active flea market, all indoors, with a large number of tables on Saturday, and about 25% of the flea market tables remaining on Sunday.

In summary, SEA-PAC is a smaller, relaxed Amateur Radio conference that draws attendees from the extended Northwest region, including other western states and a fair number of Canadians.

Zero Retries will have its first-ever exhibit table at SEA-PAC 2024, where I will be talking about Zero Retries and hoping to speak with a lot of Zero Retries Interesting Amateur Radio Operators! (Photos in next issue of Zero Retries.)

Separately, Tina KD7WSF will staff the Zero Retries' flea market table with a fair amount of ephemera from N8GNJ Labs as a fundraiser for Zero Retries. All items will be “priced for sale”.

We hope to see you at both tables!

Nice Mention of Zero Retries in Ria's Ham Shack Newsletter

The [Ria's Ham Shack Newsletter](#) by Ria Jairam N2RJ has resumed after a hiatus of almost a year. In her [2024-05-28 newsletter](#), she gave a nice shout-out to Zero Retries:

But this isn't the end for ham radio. Over the years I've seen a number of small businesses pop up and make ham radio accessories. As has been noted in Zero Retries - another SubStack that you should definitely subscribe to - many of the smaller guys are stepping up and making stuff. And ham radio has always been more of a boutique niche anyway. In

particular I have seen Scott Robbins, W4PA, take on the ownership of Vibroplex and add many more product lines. Ironically they are even selling microphones.

N2RJ's mention caused another burst of new subscribers to Zero Retries, so Thank You N2RJ!

Active Commenting on Zero Retries 0153

As I write this, there are now 20 comments on Zero Retries 0153, including several follow-ups from Jerry Wagner KK6LFS (Connect Systems, Inc.) regarding my story about Connect Systems versus DVSI.

73,

Steve N8GNJ

[Leave a comment](#)

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M17 Is a Complete System

By Steve Stroh N8GNJ

A funny thing happened in the years-long development process to create a new digital voice system called M17 Project, based on open source principles, for Amateur Radio...

It worked! All the pieces are now available for M17 to be a usable system.

Footnote from Zero Retries 0153 that, in retrospect, should have been more prominent:

It's a longer term discussion, worthy of an (eventual) dedicated issue of Zero Retries, but I've recently come to the conclusion that M17 is complete (enough) and "ready to go" to be a capable digital voice... and messaging / data... system for Amateur Radio. There are some issues, including establishing recognition that M17 is usable now, getting it adequately documented, and of course, having at least a few ready-to-use radios with M17 built-in available. But the largest issue with M17 is the momentum, and the sunk costs, of existing single-mode DMR, D-Star, SF repeaters, radios owned by individuals, and Internet interconnection networks. It will take some serious evangelism to get folks to understand the advantages of M17.

My thanks to Zero Retries Pseudostaffer [Dan Romanchik KB6NU](#) for a conversation that touched on M17 for sparking this "dawning awareness" on my part that *all of the pieces are now in place* for M17 to be used for communicating via digital voice (and probably, text messaging and data transfer, though I haven't fully confirmed that). Those that have been following M17 closely, or involved in its development, have undoubtedly understood this point, but (many? *most?*) of us merely trying to follow the progress on M17 haven't quite caught up to this development.

In answer to a likely question (thanks again KB6NU!) in advance:

Why haven't I been hearing about this progress with M17?

... I can't really answer why the official M17 team hasn't been better evangelizing that M17 *really is* "ready to go". I only recently came to this realization from trying to follow, and explain, M17 for discussion here in Zero Retries.

Another obvious question in advance:

Do we really need more splintering of digital voice modes in Amateur Radio?

In a word, **Yes**.

Yet another Digital Voice mode *is justified* given the significant technical (and philosophical) differentiation of M17. There is a significant user base in Amateur Radio that does not like using proprietary technology such as proprietary CODECs in Amateur Radio, and M17 is an answer to that issue.

The primary differentiation of M17 versus all the other VHF / UHF (repeater operation) digital voice modes used in Amateur Radio is that M17 is fully Open Source. *All* of the details - hardware, software, protocols, etc., especially the critical voice CODEC are publicly documented. That documentation is sometimes not easily found, but it's all out there. Part of my "M17 mini project" is to track down all of that for easy reference. And, with technologies such as Software Defined Transceivers and Multi Mode Digital Voice Modem (MMDVM), it's "easy" to incorporate, or switch to a new mode such as M17.

As I say above, to *fully explain all of this* requires a dedicated issue of Zero Retries (which I intend to do within the next month), and perhaps even a small book, as well as other support resources, such as...

Another resource that I think has been needed for M17 to become more mainstream in Amateur Radio is an email discussion list, which I've now created:

- [M17-Users](#) page on Groups.io (if you have a groups.io account)
- Send a blank email to **m17-users+subscribe@groups.io**.

Note - I started M17-Users as a free account on groups.io, which has a maximum of 100 users. If you try to subscribe and are told the list is "full", please be patient. I'll deal with expanding M17-Users into a paid Groups.io option (hopefully with some financial assistance) in due course.

Admittedly, it's... *inadvisable*... to create such an email list on a weekend when I won't be able to actively monitor it, but this article was the optimal opportunity to mention such a group. Thus, initially, I chose to require approval of new subscribers. I'll approve new subscribers as fast as I'm able - please be patient.

If you're interested in being a co-moderator of M17-Users, please let me know.

One last note is that in doing the aforementioned dedicated issue of Zero Retries on M17, (potentially) a small book, and the M17-Users email list, I'm not trying to usurp or bypass or exclude the existing M17 Project web page or resources, or "steal any of the credit" for all those who've created or supported M17. These items are *my individual assessment* of additional "exposure" that M17 needs to "rise to the next level" of wider usage and understanding, and *what I'm capable of doing to support M17 as an individual*, in conjunction with my work in Zero Retries. If there's interest on the part of the existing M17 team, I'm happy to work with them to integrate these resources into the larger M17 ecosystem.

And... to answer two last questions, given the nature of M17 as an Open Source system:

- Yes, I will make the contents of my (potential) M17 book publicly available (though I plan to also

sell it as a hardcopy book).

- Yes, the choice of Groups.io (a proprietary system) was deliberate. I have no desire, or ability, to self-host an email list using open source email list systems.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

QMX+ 160-6m, 5W Multi-mode Transceiver



QRP Labs QMX+ - Image courtesy of QRP Labs

The [QRP Labs QMX+](#) apparently debuted at the [Four Days In May \(FDIM\) 2024](#) conference held in conjunction with Hamvention 2024, but was not widely reported (that I saw).

The "QMX+" (QRP Labs Multimode Xcvr): a feature-packed, high performance, 11-band

(160-6m) 5W multi-mode transceiver kit, including embedded SDR receiver, 24-bit 48 kbps USB sound card, RTC, CAT control, synthesized VFO with TCXO reference. QMX+ transmits a SINGLE SIGNAL, it is not an SSB modulator with associated unwanted sideband and residual carrier, or intermodulation due to amplifier non-linearity. QMX+ outputs a pure single signal. QMX is currently only suitable for single tone FSK modes, which covers the majority of digital modes in use today (if it later supports SSB, multi-tone and phase shift digi modes will be possible). This includes everything in WSJT-X, JS8Call, some fldigi modes e.g. RTTY, Olivia and more. QMX+ is also suitable for on/off keyed modes such as CW because it has click-reducing RF envelope shaping; it is not suitable (until and if SSB is implemented) for phase shift keyed modes such as PSK31 or modes involving multiple concurrent tones such as WinLink.

The above is very short shrift for this radio that's been more than a year in development, has a wide range of *relevant* (not "fluffy") features, and is the product of one person - Hans Summers G0UPL. Please go to the link above for the full description of the QMX+.

What's amazing is that the price, if you buy it assembled, with options such as a case, is less than \$250! Granted, this is a low transmit power HF radio, but wow... for that price... it's pretty Zero Retries Interesting! What was particularly Zero Retries Interesting was this mention:

QMX+ is not yet suitable for phase shift keyed modes such as PSK31 or modes involving multiple concurrent tones such as WinLink (a later SSB firmware release will enable this).

I'm particularly interested in the QMX+ because of its 6 meter (50 - 54 MHz in the US) capability. The 6 meter band is called the "Magic Band" for its ability to act like a VHF band (short range), or an HF band (long range) depending on the whims of the ionosphere, and that sounds like fun, especially given that antennas for 6 meters can be made to a reasonable size.

To me, it's impressive that QRP Labs will (potentially; apparently it's not *promised*) enable such a significant new feature (mode), solely in a future firmware release.

Apologies that I can't find a reference to who first brought the debut of the QMX+ to my attention... but it was probably Zero Retries Pseudostaffer [Jeff Davis KE9V](#).

[In the Age of Satellites, Cell Towers and Web Servers, CMU Offers Amateur Radio Course](#)

From WESA 90.5 - Pittsburgh's National Public Radio News Station:

Carnegie Mellon University first offered the Introduction to Amateur Radio course to aspiring student radio operators in spring 2022. Students learn not only the technical skills necessary for basic construction and use of amateur radio, or ham radio, but also the history and culture, dating back to the early 20th century, when the U.S. Radio Act of 1912 guaranteed the use of the electromagnetic spectrum to the public.

"I think it's one of the very unique things about ham radio: It's a people thing," said former course student and Carnegie Tech Radio Club president Anish Singhani. "At its core, it's about the people."

Amateur radio in the advanced technological age

In the 21st century — years past the advent of smartphones and the internet — ham radio may seem like an obsolete form of communication, but assistant teaching professor Tom

Zajdel explained that amateur radio is still evolving and improving. While new technologies have asserted themselves in the sphere of wireless communication, Zajdel believes amateur radio is around for the long haul.

“Ham radio’s death has been predicted many times, but it changed a lot and evolved,” Zajdel said. “[It] used to just be Morse code, like that was your only option. Then, vacuum tubes were a thing, so you could modulate your voice ... The technology keeps changing.”

“Now you can do digital communication modes using encoding schemes and compression schemes that were unheard of 20 years ago,” Singhani said.

The technological developments in amateur radio aren’t the only thing keeping it alive. Behind the science of soldering an FM transmitter and bouncing radio waves off the atmosphere lies a technical art that never gets old to the operators.

“Amateurs like building their own equipment, and there's just a lot of pride in kind of making your own thing — can I make the antenna super-small, super-lightweight, really efficient?” Zajdel posed. “It's just really neat to see the art coming in that way.”

The amateur radio course gives CMU students the chance to connect with operators across Pittsburgh on the air; Singhani says it also strengthens personal connections across the CMU community.

“One of my favorite parts of being the president of this club has been collaborating with all of these other groups on campus that we provide radio communications for,” Singhani said. “I’ve worked with all of these different groups that do all these different things, but in some way or another, I’ve been able to help them out with [their] radio services.”

*CMU is a major technological educational institution in the US, and that **it** finds merit in offering a course dedicated to Amateur Radio is to me, highly significant.*

It puzzles me why significant developments and mentions like this are not *widely* reported in Amateur Radio media, but lack of mentions like this are why I saw the need to start Zero Retries.

[ARRL Digital Contest This Weekend](#)

The ARRL Digital contest is this weekend (2024-06-01 and 02 (first full weekend of June). In my opinion, the contest should include all of the VHF / UHF bands to be more inclusive to (US) Technician Amateur Radio Operators. Although the intent of the ARRL Digital Contest seems to be data modes, it’s ambiguous as Digital Voice would seem to be within the category of this contest, but I’m not a contester. The evolution of this contest will be interesting in future years as perhaps [FreeDV](#) (Digital Voice) and [FreeDATA](#) (data using the FreeDV waveform) converge become integrated (or at least, easily interoperable), allowing interleaved voice and data communications. I hope to participate in this contest in future years with a portable system.

Unfortunately, many of the links in the description of the ARRL Digital Contest don’t work due to the ARRL’s ongoing challenges and recovery from its recent [Systems Service Disruption](#).

My thanks to Mark Thompson WB9QZB who [posted mention of this contest](#) on the digital-mode-radio mailing list.

[Electromagnetic Field 2024 \(Event\) This Weekend](#)

Apologies for not mentioning this event sooner. I think it was mentioned to me in advance, but I don't think such a mention made it into previous issues of Zero Retries.

Electromagnetic Field is a non-profit camping festival [in Eastnor, UK, May 30th – June 2nd 2024] for those with an inquisitive mind or an interest in making things: hackers, artists, geeks, crafters, scientists, and engineers.

A temporary town of nearly three thousand like-minded people enjoying a long weekend of talks, performances, and workshops on everything from **blacksmithing** to **biometrics**, **chiptunes** to **computer security**, **high altitude ballooning** to **lockpicking**, **origami** to **democracy**, and **online privacy** to **knitting**.

To help matters along, we provide **fast internet**, **power to the tent**, **good beer**, and **amazing installations**, entirely organised by a dedicated team of volunteers.

The above description doesn't mention radio, but I think that the mentions to me (again, apologies...) stated that radio is a significant part of Electromagnetic Field.

[uSDR Software Updated to v1.7.0](#)

RTL-SDR.COM blog:

USDR SOFTWARE UPDATED TO V1.7.0

Thank you to Viol for writing in and letting us know that his [uSDR software has recently been updated to V1.7.0](#). The uSDR software (not to be confused with the unrelated uSDR hardware) is a lightweight general-purpose multimode program for Windows that supports the RTL-SDR, Airspy, BladeRF, HackRF, LimeSDR, and other SDR radios.

Viol highlights the latest features added in the 1.7.0 update below:

- Fobos SDR frontend native support, the very new SDR from RigExpert
- bladeRF API v2.5.0 support, oversampling mode up to 122.88 MHz sample rate (do not forget to update FX3 firmware)
- advanced IQ playback mode, precise timing and streaming
- improved DSP routines and memory management, minimized CPU load
- excellent ruler tool for spectrum frequency and amplitude measurements

Despite support of Software Defined Transceiver units (BladeRF, HackRF, LimeSDR), uSDR is a *receiver* application.

[Secure, Adaptive, And Intelligent: The Future Of Military SDR Applications](#)

Interesting mention of Amateur Radio, and a different way to think about Software Defined Radio, in this article from RF Globalnet:

More Than “Voodoo Magic”

SDR is popular with amateur radio enthusiasts who use the technology for radio communication, satellite tracking, and signal decoding. Ham radio operators, especially the younger generation with ECE/CS degrees love the technology but parts of the older generation frown upon SDR as “voodoo magic” with too many computer/network dependencies.

Ham radio operator and professional technologist [Onno Benschop \(VK6FLAB\)](#) says on [his podcast Foundations of Amateur Radio \(April 28, 2019\)](#) that describing SDR as “traditional radio where all the components are implemented in software” is similar to “explaining how a radio works by waving your hands and saying: here is magic.” Benschop says that how SDR works is altogether more interesting and thought-provoking than that.

“You may have heard that a Software Defined Radio hears all frequencies at the same time,” Benschop says. “Essentially, it's a voltmeter connected to your antenna, spitting out measurements as fast as it can for processing by a computer. The waveform that comes from those antenna voltage measurements represents all of the RF spectrum and it's just the beginning of what you can do next.

“In the same way that my voice is made up of lots of different parts, all played together, the RF spectrum is made up of the local broadcast stations, the local TV stations, mobile phones, garage remotes, Roy on the 7130 DX net, this podcast on your local repeater, all at the same time, all played together, to make the waveform that represents the measurements you make at the base of an antenna. Unlike a traditional radio, which has to work hard to filter out undesirable information, a software defined radio can filter out information by just deleting those measurements you're not interested in.”

While Benschop is interested in SDR because of his love of amateur radio, defense agencies worldwide seeking advanced communication solutions are utilizing it as well to the point is emerging as a vital component in modernizing military communication systems.

A sidebar on this article pointed to an RF Globalnet article from 2023-06 that I missed:

[What We've Learned About SDRs From Russia's War On Ukraine](#)

[Public Safety and Homeland Security Bureau Seeks Comment on the Impacts of the May 2024 Geomagnetic Storm on the U.S. Communications Sector](#)

US Federal Communications Commission (FCC):

PS Docket No. 24-161

Comments Due: June 24, 2024

The Federal Communications Commission’s Public Safety and Homeland Security Bureau (PSHSB or Bureau) seeks comment on any observed impacts to communications that resulted from the May 2024 severe geomagnetic storm. On Thursday, May 9, 2024, the National Weather Service Space Weather Prediction Center (SWPC) issued a severe (G4) Geomagnetic Storm Watch, forecasting a series of coronal mass ejections (CMEs) that merged with the Earth’s electromagnetic fields between May 7-11, 2024. On May 11, 2024, the storm reached extreme (G5) conditions, the first time this severity has been observed

since 2003. According to the SWPC, CMEs are large expulsions of plasma and magnetic field from the Sun's corona. Electromagnetic currents generated by CMEs, when merged with the Earth's electromagnetic fields, may distort the propagation of radio frequency waves.

[Engineering for Slow Internet - How to Minimize User Frustration in Antarctica](#)

From brr.fyi (blog of an IT specialist who spent a year in Antarctica):

It's a bit of a departure from the normal content you'd find on brr.fyi, but it reflects my software / IT engineering background.

I hope folks find this to be an interesting glimpse into the on-the-ground reality of using the Internet in bandwidth-constrained environments.

...

It's a non-trivial feat of engineering to get **any** Internet at the South Pole! If you're bored, check out the [South Pole Satellite Communications](#) page on the public USAP.gov website, for an overview of the limited selection of satellites available for Polar use.

...

Until very recently, at McMurdo, nearly **a thousand people**, plus numerous scientific projects and operational workloads, all relied on a series of links that provided max, aggregate speeds of a few dozen megabits per second to the **entire station**. For comparison, that's less bandwidth shared by everyone **combined** than what everyone **individually** can get on a typical 4g cellular network in an American suburb.

I found a mention of this blog early during his tenure in Antarctica and I was fascinated by their techie perspective of the amazing adaptations that are required (by humans) to live in Antarctica.

This particular post is Zero Retries Interesting because it explains, in contemporary terms, that *TCP/IP does work at v...e...r...y...slow data rates...* if reasonable assumptions and engineering (which they explain) are applied to Internet applications. Like "higher" speeds possible with Amateur Radio data communications on VHF / UHF such as VARA FM, New Packet Radio, etc. (think *kilobits per second*, not necessarily megabits per second).

Perhaps... [Starlink to the rescue](#) for Antarctic personnel in the near future?

TinyCircuits - Worth a Look



TinyTV 2 - Image courtesy of TinyCircuits

TinyCircuits has nothing to do with Amateur Radio (at least yet...), but they have an amusing... actually, kind of amazing, product line, including the TINYTV 2 shown above. TinyCircuits products would be an ideal gift for techies.

I decided that TinyCircuits was worth a mention here in Zero Retries given the recent discussions of new generations of portable Amateur Radio units (hopefully Software Defined Transceivers), and the challenges of small, power efficient displays, etc. In addition to the “cute” products, TinyCircuits offers the **TinyDuino Platform**:

... a miniature open-source electronics platform based on the easy-to-use hardware and software [Arduino](#) platform. The platform is comprised of a **TinyDuino processor board** and multiple **TinyShields** which add special functions, like sensors, communications, and display options that stack together like LEGO blocks. The **TinyDuino Platform** is also open-source, we have released all of the design files for all of our products. If you have a great idea you are free to design your own board derived from our design files which can be found [here](#).

Leave a comment

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out

Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything*!
- **Founding Members who generously support Zero Retries financially:**
 - Founding Member 0000 - Steven Davidson K3FZT
 - Founding Member 0001 - Prefers to Remain Anonymous 01
 - Founding Member 0002 - Chris Osburn KD7DVD
 - Founding Member 0003 - Don Rotolo N2IRZ
 - Founding Member 0004 - William Arcand W1WRA
 - Founding Member 0005 - Ben Kuhn KU0HN
 - Founding Member 0006 - Todd Willey KQ4FID
 - Founding Member 0007 - Merik Karman VK2MKZ
 - Founding Member 0008 - Prefers to Remain Anonymous 14
 - Founding Member 0009 - Prefers to Remain Anonymous 19
- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your [QRZ](#) page (or other web presence) and include a link:

<https://www.zeroretries.org>

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:

Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- [Dan Romanchik KB6NU](#) mentions “Zero Retries Interesting” topics so regularly on his blog (that I otherwise wouldn’t know about) that I’ve bestowed on him the honorific of Pseudostaffer.
- [Jeff Davis KE9V](#) also mentions “Zero Retries Interesting” topics so regularly on his blog (that I otherwise wouldn’t know about) that I’ve bestowed on him the honorific of Pseudostaffer.
- [Amateur Radio Weekly](#) by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- [Experimental Radio News](#) by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It’s a *must-read-now* for me!
- [RTL-SDR Blog](#) - *Excellent* coverage of Software Defined Radio units.
- [TAPR Packet Status Register](#) has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- [HB9BLA Wireless](#) by Andreas Spiess HB9BLA
- [KM6LYW Radio](#) by Craig Lamparter KM6LYW (home of the [DigiPi project](#))
- [Modern Ham](#) by Billy Penley KN4MKB
- [Tech Minds](#) by Matthew Miller M0DQW

Zero Retries is currently using the [Substack email publishing platform](#) to publish Zero Retries. It’s particularly suitable for small newsletters as you can get started for no cost.

If you’re reading this issue on the web and you’d like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join **1700+** other subscribers:

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Leave a comment

If you’re a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Social Media:

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

[Zero Retries / N8GNJ on Mastodon](#)

Zero Retries (N8GNJ) is also on Bluesky — @n8gnj — just click:

[Zero Retries / N8GNJ on Bluesky](#)

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

2024-05-31

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